Rheology of Ringwoodite Under Mantle Pressure and Temperature Conditions	X17B1

Y. Xu, D.J. Weidner and M.T. Vaughan (SUNY, Stony Brook)

Rheological behavior and flow law of ringwoodite under mantle pressure and temperature conditions are crucial for understanding the deep focus earthquake process in the subducting slab. In this study, stress relaxation experiments have been performed on fine-grained ringwoodite (5 micron) using a T-cup' multi-anvil high-pressure apparatus. Stress-strain measurements were determined by analyzing *in situ* synchrotron x-ray diffraction peak broadening. The internal stress was determined as the stress level at which the stress rate is zero. Ringwoodite was synthesized from San Carlos olivine at 19 GPa and 1550 K. Results show that at a pressure of 20 GPa, the yield strength of ringwoodite is 5 GPa at room temperature. The most important observation is that there is a stress drop from 4 to 0.5 GPa at the temperature region between 800 and 1300 K. The stress exponent n is sensitive to the temperature and stress. At the high stress ($>$ 4 GPa) and low temperature (1300 K) region, n is smaller than 5. We suggest that the large stress drop between 800 and 1300 K is due to a softening and flow process mainly contributed from a weakening of short-range barriers, either Peierls resistance, or discrete obstacles. Below 1300 K, the stress relaxation is due to dislocation glide since n is larger than 5. Above 1300 K, the stress relaxation process is related to dislocation climb since n is about 5.